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BLUNT TRAUMA TO THE CHEST: MANAGEMENT AND OUTCOME AT OUR INSTITUTION

General Surgery

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ABSTRACT

Background: Flail chest is a morbid condition with mortality being reported from about 15 to 25%. It is often associated with other severe injuries, which makes its management , prognosis and outcome complicated. The present study is undertaken for assessing management of chest trauma cases.. Since the reporting studies have been few, we have selected this study to evaluate the prevalence, management and outcome of blunt trauma to the chest.

Materials and Methods: In this retrospective randomised controlled study, 150 patients belonging to age group of 18-60 years who underwent chest trauma from April 2018 to March 2020 were taken and their data was analyzed which included demographic profile of the patients ; Mode, type and severity of blunt trauma to chest ; its management ,complications and outcome.

Results: Out 0f 150 patients who were included in the study, 82% of cases were due to road traffic accidents. 71% patients presented with fractures of the ribs, 24% presented with flail chest, 16% had pneumothorax, 28% had hemothorax, and 9% had hemopneumothorax and 26% of the patients had head / abdominal injuries. In 46 % intercostal drainage was done and 16% of patients with flail chest were managed with IPPV. Complications were pneumonia in 26%, ARDS in 11%, sepsis in 6%, and death in 5%..

Conclusion: The present study reveals that road traffic accidents was the most common cause of blunt trauma to the chest and was most common in young males. The overall prognosis and outcome for most of the patients of blunt chest trauma was good with majority being treated conservatively. Major intervention was in form of intercostal drainage tubes insertion.

KEYWORDS

Flail chest; Rib fracture; Blunt chest trauma

I. INTRODUCTION

Blunt trauma to chest is a significant injury to the chest causing significant morbidity and mortality. Also it is leading cause of death from physical trauma secondary to head and spinal cord injuries. Injuries to the chest causes of about a quarter of all deaths caused due to trauma. The mortality rate being around 10%[1.] Injuries to the thorax count for about 20-25% of deaths occurring due to trauma. Around 150000 deaths occurred due to road traffic accidents in India in the year 2018. Increasing prevalence of penetrating chest injury with improved pre and intra operative care have caused better prognosis than reported previously. Chest trauma causing major accident related injuries in India, contributed by increase in the incidence of road traffic accidents (18.2% of global road traffic accidents) ,increased traffic on the roads, high-speeding vehicles, with unobeying of traffic rules[3,4] .Only few studies have been conducted to realize the prevalence and its managment. This study also determines epidemiology and etiology of blunt trauma to chest and proper managing, and to analyze the prognosis of blunt trauma to the chest.. Other causes of blunt trauma to the chest were injury from falling from height, injuries in construction workers, assault. With the advancing automobile technology which comes with with air bags, seat belts and increased traffic rules implementation, injury due to Road traffic accidents will decrease. Blunt trauma to the chest is also significant in warfare[5-8] which may be caused due to bombs, blasts, stones, causing injury to the internal organs without injuring the external surface of the body. At times, difficulty arises regarding prioritizing management when more than one body system has been injured. Blunt trauma to the chest is complicated by associated other injuries such as Head injury, limb fractures. Blunt trauma to the chest is the most dangerous of all the injuries with its management should be prompt. Chest injury reduces the vital oxygen transport to the tissued either by causing hypovolemia secondary to severe bleeding and by causing trauma to the lung itself. When combined with brian trauma ,hypoxia can be potentially life threatening. Advanced anaeshthetic techniques offer safety of operation within the chest cavity[9-11]. Multiple investigative modalities, availability of blood and its products, , IPPV, newer antibiotics intercostal tube drainage , tracheostomy , blood gas analysis, along with spirometry have all together improved the overall outcome. Physiotherapy, rehabilitation has also contributed to improvement in managing injuries to the chest. In chest trauma , rapid evaluation should be done regarding the extent of injury, estimation of blood loss and rapid management by iv transfusion, complications such as hypoxia and respiratory distress and its rapid correction indicated by clear airway, expansion of the lungs and IPPV as and when required. Majority of the patients are treated by intercostal tube drainage not requiring any furthur intervention[12-15.]

II. MATERIAL AND METHODS

This retrospective comparative study was carried out in the Department of General Surgery at Mahatma Gandhi Medical College, Jaipur,from April 2018 to March 2020. A total of 150 adult subjects (both male and females) with age ≥ 18, years were included in this study.

Study Design: Retrospective cohort study

Study Location: This was a tertiary care teaching hospital based study done in Department of General Surgery , Mahatma Gandhi Medical College,Jaipur.

Study Duration: April 2018 to March 2020.
Sample size: 150 patients.

Sample size calculation: The target population from which we randomly selected our sample was considered 150. We assumed that the confidence interval of 10% and confidence level of 95%. We planned to include 150 patients.

Subjects & selection method: The study population was drawn from patients who presented to emergency in Mahatma Gandhi Medical College, from April 2018 to March 2020.

INCLUSION CRITERIA:

1. Willing patients
2. Either sex
3. Aged ≥ 18 years,
4. Patients presenting with chest trauma to casualty and associated polytrauma.
5. Medicolegal cases were also included in the study.

EXCLUSION CRITERIA:

1. Patient not willing
2. Patients refusing treatment and those who left against medical advice
3. Patients who were physically inactive.

Procedure methodology

Well informed consent was obtained, a questionnaire was designed

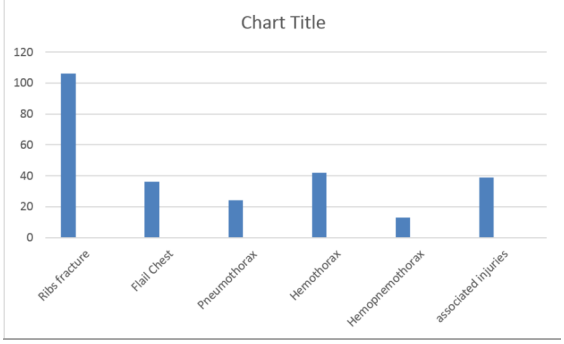
that collected the data of patients retrospectively. The questionnaire included socio-demographic characteristics such as age, gender, nationality, height, weight, and marriage, physical activity and lifestyle habits like smoking and alcohol.

The study included both blunt and penetrating trauma to the chest. Follow up of the cases was done for minimum 3 months and was extended to 6-8 months. The timing of injury and its causative mechanism together with evidence of injury associated with other systems (e.g. h/o loc, vomiting, ent bleed), were included while eliciting clinical history from the patients. Information needed was obtained directly from the patient, relatives. The initial work-up plan was formulated according to ATLS protocol. Investigations included x ray of the chest, cbc, routine investigations, blood grouping and cross matching, FAST, ultrasonography of chest and abdomen, non contrast computed tomography of head were done. The patients after being stabilized were admitted either in the casualty ward or other general surgical ward based upon the nature of the injury.

III. RESULT

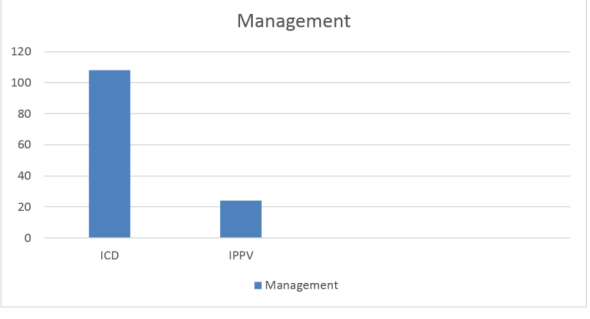
The outcome of the study is tabulated in form of facts in the following charts.

Table no 1 Our study result



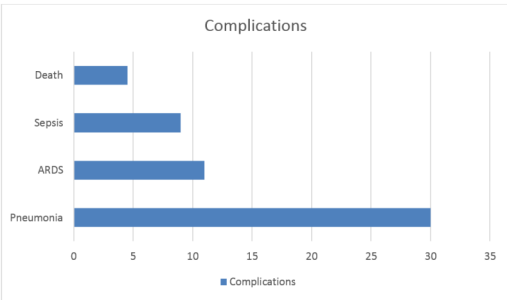
Out 0f 150 patients who were included in the study, 82% (122/150) of cases were due to road traffic accidents. 71% (106/150) patients presented with fractures of the ribs, 24% (36/150) presented with flail chest, 16% (24/150) had pneumothorax, 28% (42/150) had hemothorax, and 9% (13/150) had hemopneumothorax and 26% (39/150) of the patients had head / abdominal injuries.

Table no 2 Management modalities



In 72 % (108/150) intercostal drainage was done and 16% (24/150) of patients with flail chest were managed with IPPV.

Table no 3 Complications



Complications were pneumonia in 26% (38/150), ARDS in 11% (16/150) , sepsis in 6%(9/150), and death in 5% (7/150) of the cases .

Table no 4 compares the incidence of blunt trauma to the chest ($p>0.05$) (10)

Following tables show outcome of the study as compared to the results from the study with the existing result that is already been documented in the literature previously.

Table no 1 (10 Bold): Shows Incidence of blunt trauma to the chest. (10)

SERIES	BLUNT TRAUMA CHEST	PENETRATING TRAUMA TO CHEST
Ozgen and Duygulu (1971-1980)[5]	949 (65.4)	504 (34.7)
Kulshrestha et al (January 1983-July 1985)	149 (63.1)	87 (36.9)
Bispebjery Hospital (1973-1978[34]	181 (80.6)	75 (9.3)
Jiger et al(2015)[32]	95 (16.25)	5 (0.41)
Our Study	97(18.98)	3(0.32)

Table no 5: Comparing the median age in blunt trauma to chest

SERIES	AGE(YEARS)	SEX	
		Male	Female
Shorr et al.[16]	36.9	374	141
Kulshrestha et al.[17]	34.5	150	86
Ramussen and Brinitz[18]	50	70	23
Jigar et al[32]	35	90	10
Our Study	32	88	12

Table No 6: Comparison of etiology of injuries to the chest

SERIES	RTA	OTHERS
Shorr et al[19]	50	50
Ramussen and Brinitz[20]	60	40
Clark, Schechter et al.[21]	75	25
Johnson, Bill et al.[22]	76	24
Kulshrestha et al.[23]	67.3	32.7
Jigar et al[32]	76	24
Our study	82	18

Table no 7: Comparison of injury site in blunt trauma to chest

SERIES	RIGHT(%)	LEFT(%)	BOTH(%)
Stumm and Perry[24]	39	56	5
Kulshrestha et al.[25]	42.28	39.59	18.13
Jigar et al[32]	52	44	4
Our study	44	51	3

Table no 8: Comparison of injuries which are associated in chest trauma patients

SERIES	HEAD INJURY %	OTHER FRACTURES %	ABDOMINAL TRAUMA%	SPINAL INJURIES%	MORTALITY%
Shorr et al.26	43	40	28.5	35	1.55
Kulshrestha et al27	33	-	16.4	2.7	-
Ramussen and Brinitz28	18.3	18.3	5.4	3.2	-
Jigar et al32	10	22	12	7	-
Our study	26	1.2	14.3	6	5

Table No 9: Comparison of different injuries in chest trauma patients

SERIES	FRACTURE OF STERNUM%	FRACTURE OF CLAVICLE %	FLAIL CHEST%	SCAPULAR FRACTURE%	HAEMOPNEMOTHORAX %	HEMOTHORAX %	
Kulshrestha et al[29]	2.10	14.1	-	6.7	-	-	-
Ramussen and Brinitz[30]	2.15	-	10.7	-	30	22	-

Shorr et al[31]	4.95	8.3	10.3	4.85	21.5	10.4	3.3
Laustelia	5.59	-	-	-	-	-	-
Jigar et al[32]	1	8	17	9	5	20	4
Our study	1	9	24	3	9	28	6

Table no 10: Comparison between different modes of treatment in chest trauma

SERIES	OPERATIVE %	CONSERVATIVE %
Kulshrestha et al[19]	4	96
Ramussen and Brinitz[23]	11	89
Shorr et al[21]	7.7	92.3
Dalal et al[30]	5.8	94.2
Mandke et al[20]	9.63	90.37
Jigar et al[32]	4	96
Our study	3	97

Table no 11: Comparison of Intercostal Drainage in chest trauma patients

SERIES	Intercostal drainage %
Kulshrestha et al[19]	57 % (85/149)
Ramussen and Brinitz[5]	60% (56/93)
Shorr et al[7]	55.72 % (287/515)
Jigar et al[32]	33 % (33/100)
Our study	70% (108/150)

Table no 12: Comparison of complications due to chest trauma

Complications	Stum %	Shorr et all %	Ramussen %	Jigar et al	Our study
Empyema	-	-	2	1	-
Pneumonia	8	6.7	5	2	26
Atelectasis	5	7.3	8	3	-
ARDS	7	6.4	5	2	11
Pericardial effusion	-	-	-	1	-
Emphysema	10.2	3.8	12	-	-
Recurrent infection	9.1	-	-	-	6
Death	5	8	9.7	4	5

I. DISCUSSION

Chest trauma is the most dangerous form of injury among other injuries where prompt management is needed to prevent fatalities. Blunt trauma to the chest is accountable for 1/4 of all deaths in US[1].Blunt trauma to the chest may have fatal outcomes but mortality reduces greatly after patient reaches hopital[2]. This study consisting of 150 cases of blunt chest trauma treated at our institute was carried out for analyzing the causative factors, treatment and management protocols of patients. The study concluded at All India Institute of Medical Sciences Kulshrestha et al. (January 1983-July 1985) depicted that chest trauma constitutes 5.3% of all trauma patients (236/4434) whereas blunt chest trauma constitutes 3.35% of all patients of trauma (149/4434).[3] The study concluded by Shorr et al. in 1982, 1984 at MIEMESS shock trauma center depicted that chest trauma form 9.5% of all trauma cases (515 out of 5378) and is directly responsible for 25% of all traumatic death that occurs annually[4]. In our study there were 3 cases of penetrating chest trauma out of a total of 150 cases. The incidence of penetrating chest injuries were low in ourstudy. Blunt trauma to the chest can affect all age groups.. Majority of patients (54%) were 20-45 years of age whereas about (76%) of patients were in age group 21- 55 years, there were only 2 patients below 10 years ,there were 3 patients and 2 patients of geriatric age group. Shorr et al. study at MIEMSS shock trauma center found the mean age of the patients[4].

As per the data males are far more frequently affected than females. According to our study road study accidents were significant in causing blunt trauma to chest (82%), followed by fall from height (16%) and assault in (3%) cases. 44% of cases sustained trauma to the right side of the chest, 51% sustained trauma to the left side and 3% had injury bilateral sides of the chest. Injuries associated chest trauma were head injury, trauma to abdomen, injuries to the limbs, injuries to spine , and major pelvis fractures. Protocol for managing trauma to the chest includes various procedures. Treatment modalities may be divided as conservative or operative.

Conservative methods are usually sufficient in most of the patients presenting with blunt trauma to the chest, rarely patient may require operative exploration in the form of thoracotomy. As per our study majority of the patients were managed conservatively (97%) .Management based on conservative lines included relief of pain by use of high dosage analgesics, sedation, nerve blocks and strapping. Patients whom presented in state of shock, were resuscitated by iv fluids, transfusion of blood and oxygen. The most important parameter in management of chest trauma is patency of the airway,which may require endotracheal intubation or tracheostomy. Intercostal tube drainage is also included in conservative management. It causes decompression of the pleural cavity from the blood or air and causes expansion of lungs.

II. CONCLUSION

Following road traffic accident blunt trauma to the chest is a major and serious injury often ending up with fatal complications. Both morbidity and mortality are significantly increased but with prompt management and recent advances the mortality rate is declining. Intercostal tube drainage is an acceptable and safe management for patients presenting with pneumothorax, hemothorax, or hemopneumothorax. Simple rib fracture may be managed with analgesics alone or by strapping and blocking intercostal nerves. Respiratory distress and patency of airway should always be checked before hand and then other systems involvement should be looked into. Flail chest cases where positive pressure ventilation may be required can be achieved by appropriate skeleton traction along with strapping and tracheostomy. The outcomes are favourable and the prognosis in majority of cases of blunt trauma chest is good. More than 80% of the cases require no invasive therapy lest a few may require an ICD insertion. Violent injuries such as cardiac chamber rupture, rupture of thoracic aorta, intrathoracic inferior and superior vena cava rupture and rupture of the esophagus etc, are associated with high morbidity and mortality rates and require further different modalities of treatrment.

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